

US-IT-HXTU - Measurements of the wetted area

Ref.	[%]	[W/K.m]	[W/K.m]	[mK]	[watt]	[mbar]			[g/s]	[%]
#	wetted area	C(HXTU)	C(SSHX)	(Tpres.-Tsat)*	Qm+s	PT9314	Date	time	FT697	JT
23	21.9	208.3	949.6	8.8	55	16.0	31/07	10:28	3	21
23 s3	20.9	198.6	949.6	9.4	56	16.3	31/07	11:35	3.4	21
6	19.2	182.0	949.6	14.1	77	16.3	20/07	17:20	7.9	27
2	20.3	192.7	949.6	28.2	163	16.5	19/07	21:54	8.2	45
36	23.1	219.2	949.6	18.4	121	16.3	02/08	2:59	6.5	34.5
15	33.4	317.6	949.6	12.7	121	16.4	26/07	18:25	11.2	36
20-unc	20.6	195.5	949.6	31.2	183	16.5	28/07	3:45	9.4	48
21	22.0	209.3	949.6	32.8	206	17.3	29/07	23:45	9.8	51.5
4	23.5	222.9	949.6	30.8	206	17.1	20/07	1:13	10.8	51
24	22.7	215.7	949.6	8.5	55	18.0	31/07	13:33	3	21
24 s3	23.6	230.5	974.9	8.1	56	18.2	31/07	14:24	3.4	20
19	22.4	218.5	974.9	11.9	78	18.6	27/07	16:03	4.1	27
18	22.6	220.4	974.9	18.3	121	18.2	27/07	14:08	6.4	37
16	23.4	227.8	974.9	23.7	162	18.1	27/07	0:00	8.7	47
17	22.3	216.9	974.9	31.5	205	18.4	27/07	9:33	11	53
25	23.8	231.6	974.9	29.5	205	18.5	8/01	10:13	11	51
3	23.3	230.8	992.5	23.4	162	18.8	20/07	23:20	11.7	54
5	23.9	236.8	992.5	29	206	18.8	20/07	2:45	12	54
7	25.2	250.5	992.5	32.2	242	19.6	20/07	20:09	12.6	56.2
22-nc	21.8	216.7	992.5	38	247	19.9	30/07	23:44	13	57.3
22s3-nc	23.9	237.7	992.5	34.5	246	19.9	31/07	0:20	13	57.3
11	24.3	247.4	1020	16.3	121	21.0	24/07	18:55	8.1	35
9	33.8	344.4	1020	15	155	22.4	21/07	5:20	8.2	46
12	22.5	229.5	1020	29.2	201	21.0	25/07	2:43	10.4	55
8	21.6	220.3	1020	41.3	273	22.4	20/07	0:04	14.6	60.2
10	22.9	233.9	1020	35.2	247	21.4	23/07	14:43	12.5	56.8
14-uc	22.8	233.0	1020	45.2	316	24.1	26/07	5:50	16.1	65

NOTA

- (Tpres.-Tsat)* is the average temperature difference along the HX pipe.

$$Tp_{res} = \left(\frac{\sum TTx_1x_1}{16} \right)$$

- Colors refer to group of Tsat:

Red ~ 16 mbar -> Tsat~ 1.79 K

Green ~ 18 mbar -> Tsat~ 1.82 K

Black ~ 19 mbar -> Tsat~ 1.84 K

Blue ~ 21 mbar -> Tsat~ 1.87 K

Blue ~ 24 mbar -> Tsat~ 1.91 K

1. Definition

The Kapitza coeff. C(HXTU) and C(HXTU) are calculated for the X% of wetted area in the HXTU and 100% of wetted area in the small-scale heat exchanger test (SSHX). The wetted area is sized from C(HXTU) and C(HXTU) considering that the material properties are the same.

2. Measurements

- By default, the steady state is reached when the liquid helium starts to overflow slowly into the accumulator and when the indicator (temperature sensor TT1221) drift is lower than 2mK:
measurements performed with a minimum mass-flow.
Heaters are off in the accumulator. The liquid helium speed increase is equivalent to less than 10 W of helium to evaporate.
- -s3 are conditions for which the liquid helium level is kept constant in the accumulator. Accumulator heaters permit to control the helium level by applying an electrical load smaller than 10W.

3. Terminology:

- Q_i is the input control power applied per magnet.
- Q_{m+s} is the total load on the four magnets plus the static load.
- PT9314 is the pressure transducer in the feed-box., Tsat is determined by PT9314.
- FT697 is the mass-flow read-out on the cold compressor side.
- JT is the percentage set for the JT valve opening.
- "-nc" means nominal condition: $Q1=65W$, $Q2=35W$, $Q3=55W$, $Q4=55W$
- "-uc" means ultimate condition.
- "-unc" means that the test is performed with unbalanced powers applied to the heaters: $Q1=30W$, $Q2=20W$, $Q3=20W$, $Q4=80W$